REMARKS

The Examiner's Action mailed on June 30, 2006, has been received and its contents carefully considered.

In this Amendment, Applicant has amended claims 1 and 8. Claims 1 and 8 are the independent claims, and claims 1-4, 8-11, 17-19, 21 and 22 remain pending in the application. For at least the following reasons, it is submitted that this application is in condition for allowance.

The Examiner has rejected claims 1, 4, 8, 11, 17-19, 21 and 22 as being obvious over *Yang et al.* (USP 6,686,255) in view of *Uehara et al.* (US patent application publication No. US 2003/0178679). It is submitted that these claims are *prima facie* patentably distinguishable over the cited combination of references for at least the following reasons.

Applicant's independent claim 1 is directed to a method of making a semiconductor device which has a silicon layer disposed on an insulating film. This claim recites, *inter alia*, that the implanted oxygen ions have a peak concentration in a lower half of a silicon layer, so that the peak concentration is centered above the insulating film, and so that all concentrations of the implanted oxygen ions, both above and below the lower half of the silicon layer, are less than the peak concentration. The advantages of this claimed configuration are discussed in Applicant's specification, on page 8, line 21 through page 9, line 8, and include assisting in preventing the lateral spreading of isolation regions in fully depleted silicon-on-insulator devices. In particular, this claimed feature ensures

that the silicon layer would be oxidized through its full depth. A preferred concentration versus depth profile is illustrated in Figure 4, in which the lower half of the silicon layer is the half that is between the centered depth 124 of the silicon layer and the depth 120 of the interface between the silicon layer and the buried oxide layer. This claimed feature is neither disclosed nor suggested by the cited references.

Yang et al., as shown in Figure 2, illustrates and discloses a silicon surface layer 14 that is completely amorphized therethrough with an amorphized silicon region 14c. This reference further discloses that it is not required to completely amorphize silicon region 14c, but that it is required that a dose of amorphizing implanting ions amorphizes areally completely at least a surface sub-layer portion of the silicon layer, even if the amorphized silicon region does not reach completely through the silicon layer. Thus, the teaching from this reference implies that the higher concentration of the implanted ions is located in an upper half of the silicon layer. This is in contrast to Applicant's claim recitation, in which it is recited that the peak concentration is in a lower half of the silicon layer. The Examiner's Action essentially acknowledges this deficiency, but relies on the teachings of *Uehara et al.*

Uehara et al. is directed toward a fabrication of the semiconductor device having a silicon layer, but is particularly concerned with the insulating layer, and specifically, with selectively increasing the thickness of the insulating layer (121, 140), such as shown in Figure 3a. In order to accomplish this objective, oxygen

ions are implanted, as shown in Figure 2b and discussed in paragraph 15, followed by heat-treating, as described in paragraph 16. The oxidation step that forms the isolation regions that divide the silicon layer into mutually isolated active regions is performed separately, as shown in Figure 3b and as discussed in paragraph 17.

As discussed in paragraph 15 of this Action, the oxygen ion concentration peaks are present in both the lower half of the silicon layer 107, and the upper part of the supporting substrate 102, which is disposed below the insulating layer 120. The oxygen peak ion distribution therefore appears to be centered on the insulating layer 120. This is in contrast to Applicant's recitations within claims 1 and 8, which recite that the peak concentration is centered above the insulating film, so that all concentrations of the implanted oxygen ions, both above and below the lower half of the silicon layer, are less than the peak concentration. The fact that this reference does not disclose or suggest Applicant's claimed method is further evidenced by the fact that Applicant's claimed invention results in the silicon layer being oxidized through its full depth. In contrast, this reference shows that it is only the lower portion of the semiconductor layer 107 which has the buried insulating film 140 formed therein. Moreover, and as noted above, the primary reference teaches away from having a higher concentration of the implanted ions anywhere other than the upper half of the silicon layer, in order to ensure that the amorphizing implanting ions amorphizes areally completely at least a surface sub-layer portion of the silicon layer.

Moreover, it is further noted that the ion implantation step shown in Figure 2 of *Yang et al.* is carried out in preparation for the oxidation step shown in Figure 3, which forms the isolation region 16a as shown in Figure 4. It is respectfully submitted that there would have been no motivation for one skilled in the art to have applied a teaching that is directed toward modifying a shape of a buried insulating layer to a process, such as disclosed by *Yang et al.*, which is directed toward the creation of isolation regions which extend from a surface of the device downward to a buried insulating layer. Furthermore, even if these two teachings were combined, the resulting combination would be the ion implantation and heat-treating steps of *Uehara et al.*, followed by the ion implantation and oxidation steps of *Yang et al.* However, for the above-noted reasons, this combination would differ from Applicant's claimed methods. As such, it is respectfully submitted that Applicant's independent claims 1 and 8, and the claims dependent therefrom, are *prima facie* patentably distinguishable over the cited references. It is thus requested that these claims be allowed and that these rejections be withdrawn.

The Examiner has further rejected claims 2, 3, 9 and 10 as being obvious over *Yang et al.* in view of *Uehara et al.*, and further in view of *Prabhakar* (USP 5,869,359). Because *Prabhakar* does not overcome the above-noted deficiencies of *Yang et al.* and *Uehara et al.*, it is submitted that dependent claims 2, 3, 9 and 10 are patentably distinguishable over the cited combination of references for at least the same reasons as independent claims 1 or 8, from which these

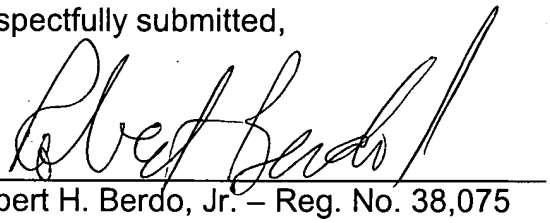
dependent claims respectively depend, as well as for the additional features recited therein. It is thus requested that these rejections be withdrawn, and that these claims be allowed.

It is submitted that this application is in condition for allowance. Such action and the passing of this case to issue are requested.

Should the Examiner feel that a conference would help to expedite the prosecution of this application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

Should any fee be required, the Commissioner is hereby authorized to charge the fee to our Deposit Account No. 18-0002, and advise us accordingly.

Respectfully submitted,



September 28, 2006
Date

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